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Conference papers consider designing facilities to meet the needs of the mentally retarded and other handicapped persons. Complete texts and summaries are provided of R.B. Price on environmental design, E.D. Helsel on architectural barriers, H. Gordon on preschool programs and facilities, and H. Palmer on training centers for young adults. Also included are papers by H.W. Maier on living units for institutionalized retarded; O. Kurren on living units for the mild and moderate retarded; W. Johnson on facilities for the deaf; C. Woodcock on facilities for the blind retarded; and J. Falick on joint mental health/mental retardation facilities. Summaries alone are given for 19 additional papers on the theories and needs of architectural design for the handicapped, with attention also paid to the international symposium and to specific types of facilities, such as schools and residential units for the mentally, physically, and otherwise handicapped. (JD)

ARCHITECTURAL WORKSHOP

Conference Report of the Architectural Institute

Portland, Oregon October 16-17 1967

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ARCHITECTURAL WORKSHOP

Conference Report of the Architectural Institute, Portland, Oregon, October 16-17, 1967.

The Architectural Workshop was held in conjunction with the 18th Annual Convention of the National Association for Retarded Children, and was co-sponsored by the Division of Mental Retardation, Social and Rehabilitation Service, Department of Health, Education and Welfare.

Acknowledgement is gratefully made to the chairman of the Architectural Workshop John L. Wright, AIA, Director, North West Region, American Institute of Architects, Seattle, Washington; to H. Curtis Finch, AIA, and John W. Broome, AIA, Portland, Oregon, who presided at several of the sessions. Representatives of the co-sponsors were: A. Rorko Vanston, AIA, Chief, Architectural and Engineering Unit, and Ashot P. Mnatzakanian, Architectural Consultant, Division of Mental Retardation; Arnold G. Gangnes, AIA, Chairman, Architectural Planning Committee, and Clayton J. Kick, Assistant Executive Director for Program Planning, National Association for Retarded Children.

This report is published by the National Association for Retarded Children in the hope that it will serve as a useful tool to all persons interested in the design of a better environment for the retarded.

Copies of this report may be obtained from:
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SUMMARY OF PROCEEDINGS

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THE ARCHITECT AND THE PLANNER

Robert I. Jaslow, M.D., Director, Division of Mental Retardation, Social and Rehabilitation Service, Department of Health, Education & Welfare

Six million citizens, 100,000 new-born children each year in the US are classified as mentally retarded. Historically they have been given minimal care, usually custodial and without recognition of any potential for rehabilitation and social adjustment. Personal dignity and respect were ignored. Today there is an awareness of the many social, medical, educational, and rehabilitation problems faced in creating a better life for all citizens. This has stimulated new approaches. Nowhere are these bolder than in the area of mental retardation — through efforts at government, state and local levels. Modern concepts in programming new construction emphasize small community-oriented facilities, providing a pattern of living nearer normal than is possible in the large, remote institution which must today find new roles in providing specific services in keeping with a new philosophy. There are two federal programs of grant-in-aid for construction on a matching basis under P.L. 88-164. One of these makes funds available for providing facilities for direct services at the community level; the other for university-affiliated facilities to train specialized personnel. Federal government publications such as " Design of Facilities for the Mentally Retarded" and "Planning Facilities for the Mentally Retarded" provide guidance in design. Mental Retardation staff will consult with architects on programming and all phases of design and construction. The architect has a vital role to play and we need his best efforts and special talents. He must base his concept of design on a knowledge of modern philosophies of care for the retarded. He is a member of a multi-disciplinary team from the beginning. During the evolution of the functional program, during the creation of the efficient design, and during the evaluation of the new building he must actively exchange ideas with his fellow team members. As an enlightened member of society he is conscious of developments in all fields and must reflect these and predict advances in the structures that he designs. He must present a new image of the field of mental retardation to other members of the general public by the physical environment he creates. In providing a community service he must understand the total community need, philosophy and plan. His judgement will often be required in the feasibility of replacement, versus new design, to meet standards. The need is not to build buildings alone. He must inspire those who work in the building. He must design for the individual for whom he is constructing a home, a school, a place of work. This is not to say that we know all the answers to the question "what do we want?". We need to test further the kinds of environment most effective in dealing with differing needs of retarded individuals. The Division of Mental Retardation moves forward in an exciting association with the Social and Rehabilitation Service of the Department of Health, Education and Welfare. We shall do much to coordinate programs for the retarded at the federal level, as has been done in state and local programs. A national clearing house of information and resource material on mental retardation, and, within it, an architectural information and research center is in the planning stage. This will enable us to be of greater service to you as it develops.

THE ARCHITECTURAL PROGRAMMING PROCESS

Roger Yost, AIA, Campbell-Michael-Yost, Architects, Portland, Oregon

Facilities for the mentally retarded involve many disciplines and many new problems. They exemplify the changing complexities and opportunities of our society, and they share its problems. These must be analyzed in the program and reflected in the design. Architectural programming at present, however, is the most unresolved of the architectural processes. At this time recognition must be given to : 1. The importance and difficulty of the task; 2. The need for adequate time and money to be expended; 3. Architect-involvement at an early stage; 4. The need for specialized consultation; 5. Continued evaluation and modification of program procedures to meet changing demands.

ENVIRONMENTAL DESIGN

Robert B. Price, FAIA, Architect, Tacoma, Washington

Good design can only arise from a well-defined program and through thorough knowledge of the problem. The environment we create is an important tool in the learning process; can simplify the job of teaching and administration; can impart upon community, teacher and student a sense of pride. A pleasant environment is not a "frill" -- it is an absolute necessity. The design team should include not only the architect, structural, electrical and mechanical engineer, but, most importantly, the landscape architect and the artist. (Complete text on page 18).

REMOVING ARCHITECTURAL BARRIERS IS NOT ENOUGH

Elsie D. Helsel, Ph.D., United Cerebral Palsy Association, Columbus, Ohio

Removal of architectural barriers is not enough — the mentally retarded and physically handicapped person must receive architectural support. In order to understand the resident as an individual, the architect should program him through a hypothetical day, learn about his past, foresee his future, recognize all his handicaps — not only those visible. The resident who enters classified as 'non-ambulatory' will hopefully not remain so. Architectural support is required to avoid limitations to his program. Specifically, space must be allowed for bulky equipment at bedside; access to dining, day areas, training spaces, and to the outdoors must be unhampered; toilet arrangements must be convenient; the incentive to walk must be provided. Above all, the atmosphere must be stimulating and attractive. (Complete text on page 21).

PLANNING FACILITIES FOR THE PHYSICALLY HANDICAPPED

Mrs. Paul L. Patterson, Oregon Society for Crippled Children and Adults, and Committee for Employment of the Handicapped, Portland, Oregon

In Oregon a joint committee, composed of the Governor's Committee on 'Employ the Handicapped', an architect, a representative of builders, and the Easter Seal Society, has been given the responsibility of providing information on planning facilities for the physically handicapped. Our primary purpose is the prevention and correction of architectural barriers in public as well as private buildings. Dissemination of information is through illustrated lectures at community functions, and through mailing of pertinent publications. Of particular interest to architects is a 12-page bulletin issued by the American Standards Association, available from the Easter Seal Society, 4343 S.W. Corbett Avenue, Portland, Oregon, 97201.

ARCHITECTURAL BARRIERS

Robert H. Dietz, FAIA, Dean, College of Architecture and Urban Planning, University of Washington, Seattle, Washington, and Member, National Commission on Architectural Barriers.

Architectural barriers are a problem not only to the mentally retarded, but to all of the 10 percent of our population who are handicapped. These persons are denied the full benefits of our society by handicaps we have built into our physical environment. Our social responsibility to alleviate these conditions is urgent. Efforts have been made, but much more needs to be done. The American Standard Association Specifications 'Making Buildings and Facilities Accessible to and Usable by the Physically Handicapped,' issued in 1961 was a significant step forward. Many Federal agencies are now and have been using this guide, but policies are diverse and inconsistent. Passage of Senate Bill # 222 , or a similar bill enacted into law, will eliminate many of these problems at the Federal level and stimulate wider efforts. Action by states is encouraging. At present 32 states have passed legislation in some form, requiring that all buildings with financial or supervisory control by state agencies be free of barriers. Government agencies will be encouraged to continue their efforts, but attention must be directed to the private sector. Costs, and the demands of the client are always debatable points. But barrier-free design need not add to the cost of a building. Revision of building codes to include safeguards for the handicapped is essential. The Commission's Report will be submitted to the President in the spring of 1968 with its findings and recommendations. It is hoped that it will stimulate and accelerate present efforts.

AN OVERVIEW OF DAY FACILITIES FOR THE MENTALLY RETARDED

Gene Hensley, Ph.D., Director, Rehabilitation and Special Education Program for **Western Interstate** Commission for Higher Education, University of Colorado

Non-residential day facilities provide primarily diagnosis and evaluation, education and training, and sheltered employment. Community day facilities for the retarded should be programmed to provide only those services that are not otherwise efficiently available in the community. Among programs now operating for the retarded in various communities are: 1. Pre-school programs; 2. Training and activity centers for school-age children whose handicaps may exclude them from public schools; 3. Adult training and activity centers for post-school education and training; 4. Sheltered workshops; 5. Public school programs in special education for educable and trainable retarded. Classrooms should be flexible enough to permit a variety of internal arrangements. Some present trends include homemaking centers within classrooms and fewer structured areas, wider use of carpeting, and playground activities pulled inside, and classroom activities extended outside. Physical facilities can set the stage for high-quality work with the retarded, and a well designed physical plant, properly equipped and effectively utilized, will determine the ease with which changes in behavior can be effected. Some general considerations in planning community educational centers for the retarded are: 1. Importance of consulting with the teacher who will use the facility; 2. Desirability of location where mentally retarded are not segregated from total school population; 3. Room sizes larger than standard classrooms (approximately 60 sq ft per pupil recommended), with space for such activities as individual instruction, minimal academics and language stimulation, educational play, personal grooming, arts and crafts, and group inter-action; 4. Acoustical treatment where noise may be distracting, and proper heating, cooling and lighting; 5. Special needs for storage; 6. Furnishings and special furniture; 7. Special architectural considerations for the multiply handicapped.

PRE-SCHOOL PROGRAM AND FACILITIES (PART I)

Mrs. Helen Gordon, Headstart, Day Care and Education Program Analyst

The architect must provide a good physical and psychological indoor and outdoor setting to meet the needs of the teacher and her children within her defined program. She manipulates elements of the total environment to develop motor, tactual, visual and audial skills, to educate the children to their highest potential and to improve their social skills. The physical and natural environment must provide ample opportunity and stimulation, both structured and unstructured, for children to exercise those skills. The psychological need of the child, especially with regard to scale and color must be fulfilled and may not be the same as that of the adult. To be effective, teachers must work with each other, with other members of an interdisciplinary team,and above all with parents. Observation of activities and communication must be facilitated.

(Complete text on page 28).

PRE-SCHOOL PROGRAM AND FACILITIES (PART II)

Roger T. Johnson, AIA, Architect, Minneapolis, Minnesota

Continuity is important for the pre-school child. Ideally there should be no more than two children for every staff member; classrooms should be about 600 sq ft in area, with adjacent toilet facilities and storage space; rooms should have darkening devices and mechanical ventilation; a small observation room with one-way glass is desirable; classrooms should have sense of enclosure; in general, facilities should be kept small.

SCHOOL FACILITIES (PART I)

William C. Oliver, Ed.D., Director of Special Education, Monterey County Public **Schools, Salinas,** California

Out of 1,000 children approximately 30 are mentally retarded. Of these, 25 are educable and can often be served in regular school settings. 3-4 are trainable, requiring a more simple and rudimentary type of training. These children are special and need special teaching -- not a watered-down regular program -- if they are to develop the best possible social skills and job-holding skills. They need more than another room. The program and predictions for future change must be adequately defined and translated into design. The 'educable' learn in concrete ways around shops and home-making experience. They are best managed in small groups around home-room cores. Many will eventually hold jobs. The 'trainable' will be dependent for the most part, when out of school. They will live at home or in foster or group homes, or in institutions. It is important to teach them to be as useful and self-sufficient as possible. They learn by routine training and exposure to many different conditions. The proper architectural setting will ease the teaching process.

SCHOOL FACILITIES (PART II)

H. David Sokoloff, AIA, Lackey-Sokoloff-Hamilton-Blewett, Architects, San Francisco, California

School facilities are expected to follow more and more the 'systems approach'. Pre-packaging of food and infra-red ovens, for example, are changing current food supply systems. Carpet-leasing with built-in maintenance will become more standard. We are in a period of change with constant proliferation of knowledge. The architect must beware of designing a framework too rigid to accommodate to future changes. Behavioral response to environment must be more thoroughly investigated.

YOUNG ADULT TRAINING CENTERS (PART I)

Densley H. Palmer, Ph.D., Department of Physical Medicine and Rehabilitation, **University of Washington**, Seattle, Washington

Three topics are under discussion: 1. The focus upon bringing about changes in behavior; 2. The capability for shifts in training programs; 3. The design of a facility which will enable the staff to compensate for the deficits in the intellectual functioning of the trainees. Generally, these individuals have small attention spans, limited motivation, poor stimulus control, memory deficit, emotional disturbance and other less obvious handicaps and deficits. All these characteristics can to a degree be compensated, overcome, decreased by manipulation of elements within the environment. (Complete text on page 32).

YOUNG ADULT TRAINING CENTERS (PART II)

Denorval Unthank, Jr., AIA, Wilmsen, Endicot, Unthank, Architects, Eugene,Oregon

The architect must concern himself with program data, the activities and goals of his client. A unique design challenge exists for the architect in assisting the retarded to learn the necessary 'survival skills' that are needed, as for example the use of public conveyances,or the handling of business transactions. Through clarification of the paths of movement by means of clear graphic symbols, color coding and lighting, the architect can greatly compensate for the deficits in intellectual functioning of the retarded. Human response to environment must be further investigated.

DESIGNING RESIDENTIAL LIVING UNITS FOR PERSONS WITH MENTAL RETARDATIONS

Henry W. Maier, Ph.D., School of Social Work, University of Washington, Seattle, Washington

Let the architect think of the residential unit as an arena for a 'program in daily living'. Think of the living space, rather than the bed space each resident will require. Each resident has his individual need, an individual desire for contact with people. On the one hand space is required for self-containment within sub-groups, on the other hand the need exists for small living groups that can also merge into larger groups for joint living activities. Consider the resident's capacity for coping with life and provide encouragement to live within his limitations. Give him a comfortable floor, if he is crawling; stimulating surroundings, if he is in bed. Think of the staff who works, lives, and has personal contact with the resident. Build well for a temporary set-up, but allow for change and improvement in the future. (Complete text on page 39).

LIVING UNITS FOR THE MILD AND MODERATE RETARDED

Oscar Kurren, Ph.D., School of Social Work, Portland State College, **Portland, Oregon**

Total participation, complete personal involvement is necessary on the part of the architect to design an effective facility. He must spend time at the institution in preparation for the design; consult with the staff. The architect can serve as unifying force and can dispel biases that may have developed among the staff. He can break down compartmentalization that may have frozen into fixed position. The aim in facility design should be total integration of services.
(Complete text on page 42).

HALF-WAY HOUSES FOR THE RETARDED

Frank E. Junkin, Superintendent, Fircrest School, Seattle, Washington

Half-way homes provide transitional living for retarded adults who are capable of substantial self support, and are being trained to assume the responsibility of normal living. Solutions to many problems such as the siting of half-way houses on institutional grounds or in compatible neighborhoods; realistic standards for design and furnishings; number and type of persons housed in one building; program responsibilities; proximity to related services; over-protectiveness of the institution; restrictive legislation can be swayed by the architect who cares and identifies himself with the problem.

GROUP HOMES FOR THE RETARDED

Francis P. Kelley, Superintendent, Mansfield Training School, Mansfield **Depot, Connecticut**

Group homes in Connecticut are modeled after the hostel program in Denmark. These are homes within the community for retarded individuals who cannot return home, are not productive but offer few medical or social problems. Eight such homes are now in operation in Connecticut, each housing 10-17 residents. House parents are selected for their counseling abilities. In designing or remodeling such homes, architects must keep in mind that these persons, afflicted with retardation, should be treated in as normal a way as possible.

LIVING UNITS FOR THE SEVERE AND PROFOUND, AMBULATORY

Gareth D. Thorne, Superintendent, Arizona Children's Colony, Coolidge, Arizona

Patients in institutions for the severe and profoundly retarded are captives of our social order. Society demands that we continue to build facilities to retain them. The state requires that buildings must last. The challenge to the architect is, first of all, to modify the structures that exist. We are beginning to know the retarded individual and to realize the skills that can help him. Principles of sensory stimulus, motor development and behavior shaping must be the basis of design. We must avoid selfcontained designs that cause the retarded to become captives in their own buildings. He must experience a wide, stimulating, attractive environment--on the grounds and in the outside world--and must be encouraged to move around within it as much as possible.

LIVING UNITS FOR THE SEVERE AND PROFOUND, NON-AMBULATORY (PART I)

James M. Pomeroy, M.D., Medical Superintendent, Fairview Hospital and Training School, Salem, Oregon

Architects must understand the purpose of the structure they are planning, who will occupy it and work in it, and what programs or activities will operate within it. The common image that the profoundly and severely retarded, non-ambulatory person lies in bed and has all of his needs attended to must be dispelled. We must not continue to provide facilities for the young in the expectation that they will never improve and never work, and thereby create non-ambulatory adults. Even the most severely handicapped can be taught to ambulate, be up and about, crawl, or move in wheelchairs. We have already learned that much can be done to develop fully their limited potential, and we are sure to expand the boundaries tomorrow. They seek love, security, recognition, and a sense of belonging. The environment we build for them should look to these needs and enhance the efforts of the staff to satisfy them. Architects can help immeasurably in making these afflicted persons more ambulatory and self-sufficient. Provide, for example, toilets conducive to toilet training, so that they will not remain 'diaper' cases; provide flexible feeding facilities, so that they can feed themselves at the skill level of which they are capable; provide bathing and dressing facilities that encourage maximum development of self-skill and a degree of pride in their person and dress. Provide adequate space for their movement and activities : accessible dining facilities, day rooms large enough for beds on casters, crutch walkers and wheel chairs. Bed space should have an allowance of 90-100 sq ft of floor area per bed. Provide windows to see out of, and doors to get out on the grounds. Such information must be communicated to and understood by the architect if he is to create an effective environment for these residents. To summarize: 1. Beware of the 'non-ambulatory' label; 2. Think of the profoundly and severely retarded as individuals who, in spite of handicaps, have the same basic needs as any other human being; 3. Build in as much flexibility as possible; 4. Provide 'aids' for the residents such as grab bars, hi-low beds instead of cribs, automatic doors for easy access to outdoor recreation areas, single-story stair-less structures; 5. Harmonize the new building with the surrounding community; avoid the institutional character.

LIVING UNITS FOR THE SEVERE AND PROFOUND, NON-AMBULATORY (PART II)

James R. Deremiah, AIA, Architect, Phoenix, Arizona

Buildings should be basically of inexpensive, non-permanent construction to allow for future change. Hardware, equipment and plumbing, on the other hand, should be of the best possible quality. Eliminate corridors, provide generous windows, carpeted floors and well-designed green areas.

SPECIAL-PURPOSE FACILITIES FOR THE MENTALLY RETARDED — AN OVERVIEW

Miss Georgia Lee Abel, Professor of Education, San Francisco State College, San Francisco, California

There is insufficient research and evaluation, and a lack of information exchange between the architectural profession and other disciplines. In general the architect should facilitate life for the handicapped, but should not design markedly different from the normal situation.

SOME CONSIDERATIONS IN DESIGNING FACILITIES FOR THE DEAF

Warren Johnson, Director, Portland Center for Hearing and Speech, University of Oregon Medical School, Portland, Oregon

The special training of the deaf and hard-of-hearing may be considered in three parts: audial, visual, and tactile/vibratory. Dependence on hearing aids and auditory training has important implications on the design of facilities for the deaf. Dependence on vision to aid communication also affects the planning of such facilities. The architect designing for the deaf must be careful to prevent air-borne or structure-borne noise and must be competent in acoustics and lighting design, or receive adequate consultation. (Complete text on page 45).

FACILITIES FOR THE BLIND RETARDED

Charles Woodcock, Superintendent, Oregon School for the Blind, Salem, Oregon

Program aims, which may be regulated by public goals, affected by staff potential and extended through research findings in the field, should always be directed toward enabling the blind child to become a well-functioning individual in society -- to be master of his physical, social, emotional, academic and spiritual life. All building should be done to enhance a program -- no program should be created to enhance a building.
(Complete text on page 57).

PHYSICAL ENVIRONMENT AND SPECIAL EDUCATION

Bertram Berenson, AIA, Director, Division of Architecture, Hampton Institute, **Hampton, Virginia** (Council for Exceptional Children).

We are concentrating today too much on "how to do it", rather than "what to do". We have not learned to discriminate between what works and what has meaning. We do not know how the retardate adapts to his environment. Through basic research this must be tested for its adequacy, usefulness, effectiveness, impact on the educational, training, behavioral, social, cultural condition. The methods employed by the architect to solve problems have changed little for hundreds of years. He can no longer work alone but must be part of an interdisciplinary team, and together they must learn to utilize the volumes of information in the process of design.

JOINT MENTAL HEALTH/MENTAL RETARDATION FACILITIES

James Faliok, AIA, Caudill, Rowlett, Scott, Architects, Houston, Texas

As part of a national trend, these combined health services are now to be community-based, community-operated and community-oriented; to be given identity and visibility to promote care, prevention, and to remove stigma. Each community will require its own solution. Architectural programming is the most important phase in design and demands a joint effort by two groups: the health facility staff and the architectural staff. Working together as a team, teaching each other, ensuring that each understands the other, often through graphic communication, the architect and the client together establish aims; collect, analyze, organize facts; uncover and develop concepts; determine needs; state the problem; investigate possible alternative solutions; develop the final solution.
(Complete text on page 60).

PROGRAMMING AND DESIGN OF MENTAL RETARDATION/MENTAL HEALTH CENTERS

Mrs. Ruth Wood, Executive Secretary, Boulder County Interagency and Citizens Council on Mental Retardation, Boulder, Colorado

Boulder County has completed plans for a combined Mental Retardation/Mental Health Community Center to be built adjacent to an existing Health & Welfare Center. The two divisions will be housed in separate wings, each with its own administration. However the two wings are to be interconnected to facilitate the free interchange of staff and certain facilities and equipment. The Mental Retardation wing will provide a day-nursery, school facilities, a sheltered workshop for 200 children and adults. Architect Hobart D. Wagener took full advantage of studying the existing operation in the old building before programming and designing the new facilities.

REPORT ON UNIVERSITY-AFFILIATED FACILITIES

Arnold G. Gangnes, AIA, Architect, Seattle, Washington

The US government and the universities have formed a partnership to combat mental retardation. Federal funds have been appropriated to stimulate the building of university-affiliated facilities for the mentally retarded, with the primary purpose of training additional specialized personnel through an interdisciplinary concept. Many colleges have applied for the funds and the impact of this program will be widely felt in making available more skilled personnel, in furthering the development of new therapeutic methods, and in developing more specific data concerning the effect of the environment on the patient.

REPORT ON THE INTERNATIONAL SYMPOSIUM

Robert B. Church, AIA, W. Glenn Bullock & Robert B. Church III, Architects, Knoxville, Tennessee

The three-day meeting of the architectural section of the international convention at Montpelier, France, was particularly useful as a platform for the exchange of ideas with interested persons from all parts of the world. Points made during the course of the meeting were: 1. architects can no longer work on intuition alone -- the need for research is great; 2. minimum standards should never be set; 3. cost alone should never be the determining factor; 4. do not design for function alone; 5. realize the importance of flexibility; 6. read, study, observe, work toward the development of a more humane and therapeutic environment.

COMPLETE TEXTS OF SELECTED PRESENTATIONS

Robert B. Price,
FAIA,
Architect,
Tacoma, Wash.

ENVIRONMENTAL DESIGN

I believe it is of great significance that the subject of environmental design should be a topic for discussion at the very outset of this two-day , all-inclusive program so important to our communities and to our nation. It is significant too that the subject follows directly the topic of "The Architectural Programming Process".

Programming is all-important. It has been my contention for some years now that the success, both functionally and architecturally, of any building undertaking lies in a strong, well-defined program of aims, aspirations and desired goals. Time, much time, should be allotted this most important aspect of the planning and building process.

My plea today is that architects become part of the programming team. Great design comes only as a result of knowing as much as possible about the subject for which we are designing. Before a line is put on paper, the architect should know the program and the problem, and know them well. Only out of a program, pregnant with new and contemporary possible architectural solutions, will come a facility that is truly fine.

Buildings are built because of a need. First and foremost, that need must be met in the best possible manner. A facility that does not function, regardless of its architectural merit, is a failure. A facility that is not beautiful and does not incorporate the principles of good architecture — pleasant spaces, good massing, interesting contrasts, appropriate scale, pleasing proportions — is also a failure.

Assuming that we have a fine, imaginative program, well defined as to use and function, it is now the task of the architect to transfer into three-dimensional spaces and areas this program. How well he does this is very important.

Those of us in architecture who have been privileged to design schools for the students of our communities know that to design a great school does three important things: First, the environment we create is to the student, whether of kindergarten or college age, an important tool in the learning process. Second, if this environment is pleasant, it simplifies the job of teaching and administrating, leaving more time and energy to the real task of teaching. And, third, it imparts upon all — the community, the teacher and the student — a sense of pride that helps fulfill the need for the facility.

I do not pretend to be an expert on the design of facilities for the handicapped. However, at this time my firm is designing three such facilities for the Tacoma Public School system. Many months were spent in defining a program. I attended every study session. The results, I believe, are very exciting. To Dr. Henry Bertness, who heads the program for the handicapped in the Tacoma Public School system, the architectural solution holds promise that he will be able to administer a new, fruitful curriculum to the students, never before possible. Every effort was made to make the facility as "un-institutional" as humanly possible. Every effort was made to make the areas and spaces as "home-like" as possible. Every effort was made to make it an easy place in which to administer and instruct.

Our teacher to student ratio is approximately 1 to 5. This required areas and spaces for many different activities. One area is a living lounge, simulating a pleasant living room with one wall of glass opening off into a planted and paved court. Floors will be carpeted. Lighting is of a type found in homes rather than conventional schools.

We spent a year planning, yet we are not sure that all we said and planned for is valid. Therefore, the entire scheme is flexible. Walls are simple screens. Spaces are flexible. We wished to give those who must use the facility a chance to experiment and change.

Pleasant environment is not a "frill" — it is an absolute necessity. Environment implies both interior and exterior. Is the approach to the facility a pleasant one? Does it give a lift and feeling of anticipation of more pleasant visual experiences? Has the site been used to advantage? Is there a sense of well-being and purpose? When entering the building, does it welcome you? Is the detail crisp and orderly? Are the materials and textures pleasant? Is it a fun place to be in? Has the use of the third dimension — height — been capitalized upon to add interest? Has natural light, properly shielded, been explored? Are the colors good but not sterile? Or are they garish? All of these things are ingredients of any good piece of architecture.

Immediately the reply will be — but it costs more. Nothing could be further from the truth. The same program, the same list of materials, the same budget, given to the architect who cares, costs no more. In fact, the straightforward, direct, imaginative approach often costs less. Your architect must have courage. If he believes that he can give order and beauty to an architectural solution, then he must stand by his convictions. Too often the practical approach is discussed at the offset. Pleasant courts are a maintenance problem. Floors, other than terrazzo, are hard to keep up. A block or concrete building will stand up over 50 years longer than one of a more sympathetic material. This is , what I call, janitorial design. This is what we have had in the past. All rooms are painted sick beige or bilious green. Why can't these buildings be gay, cheerful, and full of surprises? They must be the very best we can do.

And, if the facilities are to be the very best, I make a plea for a design team that includes architect, structural engineer, electrical engineer, mechanical engineer, and, two more -- the landscape architect and the artist.

Outside spaces, courts, planted areas, playfields,trees and mounds are all important to the environment, as is the artist's sculpture. I try to incorporate into every building some form of art work, be it a free-standing piece of sculpture, a wall frieze, a whimsical design beside a door or other completely useless, but necessary element for the environment. For so many, this will be the first contact with the beautiful. We must not let them down.

It is so important that all buildings be good; especially the buildings for the children of this nation. For so very many it will be their very first experience with pleasant environment. We hope it will not be their last.

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REMOVING ARCHITECTURAL BARRIERS IS NOT ENOUGH

Grateful as we are for the national attention being given to the removal of architectural barriers from buildings built with public funds, it is not enough to assure the physically handicapped/mentally retarded adequate architectural support for a truly appropriate program to meet needs.

At this very moment there are on the drawing boards, under construction, and just opening doors to residents, millions of dollars worth of residential facilities, which reflect a philosophy of care of the physically handicapped/ mentally retarded which is woefully out of date. One state alone whose architectural plans leave much to be desired, has annual construction costs for such facilities of over $ 6 million, and over double that amount of construction in the planning process.

Let me hasten to explain that the fault lies not alone with the architects (although I am not excusing them of responsibility entirely), the fault lies equally with the programmers who are advising and consulting with architects, and who have failed to keep current with changes in concepts of care and management of the physically handicapped. Particularly at the severe and profound level, our warehousing of these unfortunate people in unclean, unwholesome, unattractive wards is a national disgrace. Part of the fault lies also with the voluntary agencies who are sensitive to and should be militantly and aggressively responsive to such conditions. Fortunately such groups are changing their positions and with united attention focused on this problem of suitable architectural design, I expect mountains to be moved and progress to come fast.

Where to Begin

One thing came out loud and clear at the Denver Conference on " Architectural Contributions to Effective Programming for the Mentally Retarded" — start with the resident. Know him as a human being in all his degrees of handicaps, both mental and physical; know him as an individual at all his life ages ; know his needs in terms of services and his human needs; program his day on an individual basis. Then begin to design a facility in which he can live in human dignity in clean, appropriate, stimulating and attractive surroundings.

If you begin with the non-ambulatory physically handicapped mentally retarded individual in a residential institution, two basic architectural problems emerge:
1. Architectural barriers within the institution prevent him from living with compatible peers and receiving services which are appropriate to his needs. He is denied his right to progressive patient care because of architectural impediments. Gunnar Dybwad said it so well at Denver — non-ambulatory may be an appropriate description at the time of admission but it should not be a life sentence.
2. Design inadequacies limit or prevent appropriate programming in the non-ambulant wards.

Barriers to Progressive Patient Care

I am using the phrase " progressive patient care" to describe the practice of taking individuals at their level of functioning, training them to function on a higher level, and then moving them out of the ward to which they were admitted to the next higher ward, where individuals are functioning at that higher level. An example would be toilet training. A non-ambulant who entered non-toilet trained, on accomplishing training should be moved out to a continent ward or cottage. Although lip service is paid to this concept by superintendents, it is not true for the non- or semi-ambulant individual in most institutions. Certain areas are designed for non-ambulants and there they stay — regardless of their functioning level. Unfortunately in most institutions, programs (training programs, educational programs, recreational programs, social programs) are tied in with certain wards and cottages. Many superintendents try to rationalize when we confront them with this situation by saying the wheelchair people are taken out of the non-ambulatory cottages to programs appropriate for them. Don't you believe it— let a little rain fall or snow, or the attendant force be in short supply (and when is it not) and those non-ambulatory residents do not get to school, or workshop, the recreational event or the social event. This situation is doubly penalizing for the individual at the higher intelligence levels because not only do the non- and semi- ambulatory residents miss training and education that would enable them to function at their true ability level, but they must live all of their lives with lower functioning people. Non-ambulant individuals are the very ones who come in with a history of environmental deprivation; they desperately need the stimulation of more highly functioning people.

Unless institutions are barrier-free (including the toilets), there are going to be problems for the non-ambulant resident. If he could live with his 'run-about' peers with similar interests and abilities, not only would he be better off, but time and again I have seen a buddy system develop where another ambulant individual takes over the pushing of the wheelchair, the helping to the toilet where it is necessary, the pushing to the dining hall. These 'buddies' gain something from these experiences of being able to help someone else once in a while.

Since over 30 % of the residents of multi-purpose institutions have some motor handicaps it is high time something be done. Obviously institutions for the retarded should not be accredited unless they are barrier-free.

Design that Limits Program

This second area is the target area in my presentation--design inadequacies that limit or prevent appropriate programming for non-ambulatory residents. Since Cerebral Palsy has been concerned with these persons in institutions in recent years , and since we have had experience in caring for and programming for these kinds of individuals for many years at the community level, we feel that we have gained some insights into what can be done in institutions to improve care, providing the proper spaces and adaptations are provided. In ten minutes I can scarcely write you an architectural program for building for non-ambulatory residents. I can point up some of the changes in concepts of care of the socalled "bed-fast" patient, so that you can take them into account as you design spaces for them.

Largely through the efforts of our Nurse Consultant, Mrs. Una Haynes and our Program Services Director, Mr. Sherwood Messner we have collected, developed, begged, borrowed, and improvised techniques and equipment which, when properly and consistently used, we feel can reduce the bed-fast segment of institutional populations markedly. Indeed we see no excuse for 24-hour bed care, except for the extreme hydrocephalics, the extremely deformed geriatrics, and a handful of rare anomalies. Using Slominski inserts in wheelchairs, protective and supportive pads and restrainers, trays for further support and control, almost all socalled bed-fast individuals can be out of bed, dressed and mobile for a good part of the day. For younger and less involved children Hogg strollers, again with good body supports for feet and hips, and trays to prevent forward-flipping can be used. For more severely involved patients or those who have been horizontal for too long a period, tilt tables can be an intermediary device. For those whose anomaly prevents even a supported position there are litters or wheeled carts.

Why does all this concern you as an architect? Because you must design space at bedside for this type of equipment. The inserts and supports must be individually tailored to fit each individual and his problems. They must be at bedside if they are to be used and not consigned to some equipment storage pool down the hall. Many rather severely involved individuals have been trained to transfer on their own from bed to chair or to wheeled cart. For those individuals beds must be secured, and usually the height must be adjusted. Once these patients have wheels and a secure, supported positioning, they are ready to go out of the bed area — to the dining room to eat, to the school room to learn, to the activity room to play. Even tilt tables can be rolled to dining areas if space is provided. Dining areas too must have extra storage space for the multitudinous adapted devices that can enable many of the socalled 'non-feeders' to achieve independence,or at least feeding with minimal assistance. There must be a place for the cuff weights, the sandbags, the clamps and special bowls, plate guards, built up and angled shanked utensils — to mention just a few of the pieces of adaptive equipment. Anita Slominski of Indiana University Medical Center and Mrs. Haynes have developed a unique and ingenious regimen for severely involved infants and young children to start them sucking and swallowing; to move these young patients and some older ones too off tube feeding and onto bottles; then off bottles to straw drinking; then using infa feeders to shift them gradually to semi-solid food; then to solid food and finger feeding and finally to eating with utensils.

Why should this concern you? Because if this type of regimen is faithfully followed, the severely involved children of today will be capable of eating in dining rooms tomorrow.

Another change in the management pattern of the severely involved that can be effected is in the area of bowel and bladder training. Rather than consigning these individuals to a life of messy incontinence, it has been demonstrated that reflexive bowel training is possible for large numbers of these individuals. However, commodes must be tailored individually , so that firm foot support and body support are effected.

Why does this concern you as architects? Because once again space must be designed for the storage of these commodes, hopefully with some privacy for older residents. Although we have not used operant conditioning techniques to any degree, these techniques too will diminish the amount of incontinence in patients. For those for whom bladder control is not a possibility, there are innumerable measures which can be used, even with adult patients, so that they can leave the unit and the grounds for several hours. You don't have to build puddle-proof floors, if proper measures are taken.

These are not hypothetical suggestions of how things could be. There are a few institutions which are already making giant strides in instituting these procedures. The Warren G. Murray Children's Center in Centralia, Illinois under the direction of Chief Nurse Barbara Campbell is doing an outstanding job. Central Colony in Wisconsin under Superintendent Harvey Stevens and Director of Nursing Pat Mc Nelly is developing nursing procedures for extreme hydrocephalics and bizarre anomalies. The training and therapy program for low level children at Central Colony is giving concrete evidence that these children can function at higher levels , if intervention is early and skilled.

Summing up once more some of the ways in which architects can design more appropriately for the severe and profound and multiply handicapped:
1. Do not design units for the 'bed-fast' , but allow space at bedside for bulky equipment. Some non-ambulants can learn to dress themselves, provided adaptive clothing is available and clothing lockers are accessible.
2. Into non-ambulatory units you can design dining spaces, day room spaces, training spaces, access to the outdoors for wheelchairs, crutch walkers, litters and beds to patios and outside walks, so that these non-ambulants can be trained in self-help skills and can live, eat, play and relax in as near normal fashion as their disability permits.
3. You can provide toilet facilities which permit self-use whenever possible by building in grab bars on toilets and tubs, stools and tubs at the best height for easy transfer, no sills on shower stalls, seats in showers, water control levers where they can be reached by wheelchair residents, sinks that accommodate wheelchairs, tilted mirrors so that

they can see themselves from a wheelchair, counters around sinks to set down grooming equipment. Consider the installation of some bidettes, American style, to assist attendants and the residents in cleansing themselves, as well as to assist with voiding problems. For toilet training units you need extra space so that wheelchair resident and trainer can maneuver.

4. Put drinking fountains, storage cabinets, wall switches, etc. so they can be reached from wheelchairs.

5. For children, space must be designed for being out of bed and for mobility equipment — scoot boards and sling crawlers. Floor surfaces must encourage creeping and crawling and must not be rock hard.

6. You can make the atmosphere attractive. Don't design living units of cold steel and tile.

7. As we learn more about architectural psychology and the therapeutic effect of environment we need to take a new look at what we are doing to these non-ambulant people — especially those who spend time lying in bed looking at four white walls and the ceiling. You can provide windows looking out on attractively landscaped grounds, you can use different wall finishes with different colors and designs. You can include aviaries, aquaria and habitat cases.

8. You should give some consideration to the socio-petal ideas of Izumi and Osmond who recommend that each resident, including the non-ambulant one, have easy access to three zones — complete privacy, the intimate group, and the larger group.

9. For most individuals who are limited in their mobility, living environments should provide all kinds of stimuli — visual, auditory, tactile, kinesthetic. Their problems are more likely to come from understimulation, rather than overstimulation. As Gunnar Dybwad said at Denver " we should thank God for any stimulus to which they answer."

One of the truly rewarding aspects of working in this area of the severely involved is the encountering of stimulating people, often at unexpected places, such as the Denver Conference. John Garber, for example, reported how he and his colleague, Dr. Chapman, went about analyzing and then attacking the planning process in relation to three new institutions for the retarded (see Conference Report " Architectural Contributions to Effective Programming for the Mentally Retarded", published by the National Association for Retarded Children). Starting with a three day experience as an attendant in the wards of Willowbrook, these architects evolved not only one of the best analyses of needs and services, but provided insights into the role of the institution, and a philosophy and program of care for the retarded that rivals the best thinking of the most forward-looking programmers. Why did they do such a remarkable job? Because they started with the resident as an individual. They looked at three hypothetical individuals — one mildly retarded, one moderately and one severely. They looked at the services each individual would need over a lifetime, programmed a hypothetical day, and then designed to meet these programmed needs. If you want to build a better building, I strongly urge you to follow their example, including working in the wards.

Conclusion

If, as a society , we really believe in the dignity and worth of every human being, we will provide clean, appropriate and attractive surroundings for all our residents. Or, as Mr. Arnold Gangnes said at Denver ,"Our guide must be those retarded persons who are cleaner, happier, more capable, and more purposeful because of our efforts."
If you begin your thinking and planning with the resident in mind — particularly the severely involved residents — you will not only be building the best building you are capable of building today, but you will also be more apt to be building something of which you can be proud tomorrow.

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PRE-SCHOOL PROGRAM AND FACILITIES

Research in the fields related to human growth and development remind us that if we are to stimulate the development of the cognitive learning skills of a child, we must pay attention to all of his learning modalities. Let me put them in simple focus for our discussion today:

1. Motor
2. Tactuality (including taste and smell)
3. Vision
4. Audition (hearing and speaking)

Research goes on to say that in the development of learning skills of young children ample opportunities, structured and unstructured, must be provided for a variety of sensory motor experiences. If this is so, the very facility (building and rooms) must provide the space and arrangement as well as equipment, in and with which these experiences can take place. This would be equally true for indoor and outdoor settings.

Let me give you examples of such settings. I would like to cite some extremes: In Holland I saw a classroom of a very old public school building being used for a pre-school class of moderately and some severely retarded (and a few multiply handicapped) children of pre-school functioning levels. It was on a ground floor requiring no stairs. It was a large room fitting the legal requirement in my state of 35 sq ft per child. Its windows were too high to allow any looking out. It had no sinks and no bathrooms adjacent to or within the room. It did have space and an ingenious teacher, but only one, who used the floor space to advantage despite the lack of equipment, to try to provide a meaningful program for eight children. Hooks along one wall held coats. One area had newspapers on the floor on top of which stood a big old washtub with water. Another area had long strips of newspaper in various widths pasted to the floor to simulate rolling, crawling and walking board lanes. Another area had a work table with a variety of odds and ends for touch, taste, smells,to be pasted and glued. Another area, the center of the room, had a few larger tables which could be used as tunnels for climbing. The paint on the walls was peeling. The lights on the ceiling were too high. There were no acoustical tiles to dim the sounds. Going to the bathroom required constant supervision (usually meant taking the entire group, rather than leaving any children alone). The playground was bare, except for some sandbags and a ball or two.

At the other extreme, let me illustrate another classroom for the pre-school retarded: This was a large colorful room but not too bright with an entire wall of windows which looked out on a play court with some trees and grass, with visible houses, sky, lamp posts, etc. Vertical blinds could be lowered to close off too much light, or when distraction needed to be at a minimum. There were low, acoustically tiled ceilings and excellent lighting. A series of low, movable wood screens and a careful arrangement of cupboards and other furniture created a variety of play areas for big motor activities — climbing, rolling, jumping, lifting, stacking, pushing, building; a house-keeping corner in which a good many self-help and social skills can be developed — table-setting, dressing, washing dishes, pouring, stirring, eating, tasting, sharing; a creative arts area with paints and easels, collage, sorting, touching, small hand-manipulative toys ; a listening area for records, stories, books , with a small rug on the floor. Here too there were eight children supervised by two adults, a teacher and an assistant, and usually they were helped, as were the children, by the presence of a trained volunteer.

What is it then that I would want for a pre-school facility?

Footage, not only to meet legal licensing requirements (35 sq ft per child) , but primarily because this footage is necessary to allow for all the learning experiences.

Acoustical tile ceilings , to lower the sound level, which can be a most harmful distraction.

Windows from which to look out, bringing outside relationships inside and vice versa. Let me cite an example here: the mildly retarded boy of five had been learning shapes by means of blocks, cardboard cut-outs and picture forms. He touched, he tasted , he sorted, he compared. One day, as he looked out of a second-floor window he remarked that the top of a house (meaning the roof) was like (and he went back to the table to fetch) the triangular block.

There must be room to allow free mobility for the child in going from one area to another, for example, from the housekeeping corner to go shopping (which means building a store of blocks). They need a place to paint a sign to be posted above the store.

I recall the group of boys , including some retardates, who built a large block airplane. These were boys whom teachers had tried to get interested in smaller muscle activities, painting, clay work, etc. When I commented that it was hard for me to know whether this was the plane I was to meet, two boys ran to get some paper, paint and brushes, to put on some letters of the alphabet and a number. It was a first step , connecting through play activities, several learning modalities.

There should be a sink in the room , where one washes self, dishes, paint brushes, and brushes teeth. It should be placed low with a mirror above it and should have counter space. Bathrooms should be directly adjacent since training in toilet habits is an essential part of the program.

Walls should have texture as well as color. Floors should be of vinyl tile or of some material that is easy to mop and wax. Built-in cupboards should have some sliding doors to shut out distractions, but should be accessible to children so that they can learn to secure materials. There should be cupboard space for blocks, trucks and dolls,and cubicles for coats and boots.

Ample work space should be allowed in a small room adjacent to the classroom for the teacher's desk and files. Within the building should be a nurse's station and isolation quarters for the sick child. In addition there should be a good-sized cupboard for extra supplies with ample shelves and hanging space.

There must be a janitor's supply and equipment room with a big sink. If children are to be there all day, classroom requires footage and space for stacking and setting up cots for naps. A kitchen with cooking and refrigerator equipment, space for dishes, working tables and food storage must also be provided. This,ofcourse, would need to meet licensing standards.

Outdoor space must allow for digging in dirt and sand, climbing and sliding equipment, wheel toys, including wagons and tricycles. There should be access to water, including a drinking fountain. A storage shed must be handy for wheel toys, pails, shovels, etc. In every instance equipment must not only allow for motor and sensory learning experiences, but must lend itself to adaptation so that some imaginative play can develop. A tunnel can allow for walking, crawling, riding through. A climbing box can also be a cage and a forest ranger's post. There should be direct passage from classroom to outdoor area. In places where it rains a good deal of the time we would need a large covered outdoor space, with light filtering through the top and the sides.

Briefly stated we need space for child and adult; attractiveness; connection between outside and inside; good lighting; some sound deadening; equipment that can be easily moved and easily cleaned for storage and teaching purposes; one-way mirrors, so arranged that one can easily see the entire room. This is necessary not only for staff observation and record keeping, but is extremely helpful for parents who should come frequently, observe and then have use of staff and teacher lounge for discussion of observations. Raising children is no road to paradise, and rearing a handicapped child presents many problems. All parents can benefit by widening their repertoire of child rearing skills through a discussion.

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YOUNG ADULT TRAINING AND RE-TRAINING CENTERS

The three areas which we will examine are: 1. the focus upon bringing about changes in behavior; 2. the capability for shifts in training programs; 3. the production of a facility which will enable the staff to compensate for deficits in the intellectual functioning of the trainees. In our discussion I will try to bring each of these broad topics to bear on specific physical features of the training center.

Changes in Behavior

One of the most potent developments in the training of the retarded and other groups has been the application of learning theory principles, specifically, the application of operant techniques. The basic principle involved in operant methods is that behavior is determined by its consequences. In simplest form, if we wish to change a specific behavior emitted by an individual, we would change the effects of that behavior. If we desire to eliminate the behavior, we would remove the chance of the behavior producing the effect it usually produces for the person. Conversely, if our goal is to increase the occurrence of a behavior, we would make certain that a positive effect results on nearly every appearance of the behavior.

This approach to training will, I am sure, characterize the activities of many training centers. As an approach it is not limited to training vocational behavior. It is equally as applicable to modifying behavior in social settings and at home.

Use of operant methods has definite implications for facility planning. Consider the usual model of vocational evaluation. One typically thinks of a testing room and carefully designed and administered tests of interests and aptitudes, the results of which are combined in some esoteric fashion by the evaluator, who then prophesies about the future of the puzzled job seeker. It has been through rather painful experience that many of us now regard as fruitless the attempt to speculate about a retardate's vocational future from test data which, for him, may have questionable validity. Much of the emphasis placed upon testing in a narrow sense is re-directed as evaluation becomes something other than paper and pencil in nature. In place of the testing room, or, more precisely, as an extension of it, evaluation frequently takes place in a setting which permits careful observation of trainee behavior at a worklike task. Of equal importance to the traditional question, "What kind of work could this person do?" is the question, "What conditions are necessary for desired work behavior to occur?". Some programs use a group approach in which several trainees are evaluated simultaneously under the scrutiny of a crew of trained evaluators. Others prefer the use of individual appraisal in a private setting. In either case the emphasis is upon behavioral observation and measurement, and the goal is the development of an explicit statement about trainee behaviors in terms of : 1. which of his behaviors should be eliminated; 2. which should stay; 3. which are absent and need to be produced.

Given this approach to the training problem, each trainee's prescription for training has a unique quality. Even when vocational goals are identical for two trainees, their training programs may differ because of differences in the behaviors they bring to training.

Before, during, and following a training period, the stress is upon observation of the trainee. Such observation occurs in various ways: an evaluator working directly with a trainee; a one-way mirror between the evaluation room and a room occupied by the evaluator; closed-circuit television in which several undividuals working in isolation can be observed simultaneously from a single monitoring point; and, from the record of responses made on some kind of automatic evaluation device. The evaluation area includes, then, both the space in which the trainee performs and the space — immediately adjacent or set apart — occupied by the evaluator. More will be said about these evaluation areas a little later. My impression , after reviewing suggested floor plans and visiting several programs is, that they have usually underplanned for observation facilities, particularly in work and social activity areas.

What are some of the behaviors which might receive attention in a center? Many trainees will need to learn regularity in attendance and punctuality in arriving at and leaving work. Others, having acquired these habits in previous school work experiences or in training at home will need to learn operation of a time clock, or the specific actions required in performing a particular job. For still others the emphasis may be training them to perform in a more independent manner the tasks assigned to them at home; or, it may concentrate upon training them in basic social skills essential to their maintenance during the hours away from the job. How does this variability in learning affect planning of the center?

Attempts to plan a uniform schedule of activities for all trainees will not go very far in fitting their individual differences. Trainees may be scheduled to arrive and depart at different times during the day and evening. There will probably not be any uniformity across trainees in time spent at any particular assignment. For example, two hours at a work task will be possible for certain young people, but will be the goal of a graduated program for others. Movement from one work area to another without becoming lost is a skill which some will need to acquire. The important consideration here is that traffic through the facility will vary not only in volume, but in the frequency with which new trainees, in particular, may need to move from one place to another. Related to this is the likelihood that trainees may enter and leave work areas according to their own schedules. I cannot foresee all of the features this individual movement might require. It will need to occur in such a way that interference with the activity of others is minimized. Given the group we are discussing, this is no small matter.

What specific training techniques might be employed in young adult centers? Interesting developments in automated training are taking place. Teaching machines have been devised which train the worker in job skills, money management, and fundamental social amenities. My impression is that these are best used with the mentally retarded in an individualized training area.

An example of another technique involves interaction between trainer and the trainee. Training in cashiering has occurred in which the trainer observes the trainees operation of the cash register. Errors are penalized by the trainees paying the trainer a fee from an amount given the trainee before training.

Training in groups will occur for practical reasons and, I hope for reasons having some other empirical support. Training in social skills, and on-the-job interaction can profitably take place in groups. My own feeling is that training in small groups of 8 to 10 people is most useful for purposes of trying to generalize what has been learned in individual sessions and in the presence of only the trainer.

Much could be said about the specifications for training rooms. Of critical importance is the control of variables which could interfere with training, such as distracting sounds and visual stimuli.

Before leaving this first area let me suggest that one of the most important contributions of such a center will be to those mentally retarded young people who are working. This contribution may take the form of refining job skills used in employment. It may also be designed to move the person to greater social independence by offering continued training in self-care, or "survival" skills such as cashing and handling checks, bill-paying and grocery shopping. We should also expect that there will be contact with some young people who are in their "second time around." The jobs for which they were trained are over and there is the need to equip them for new employment. It is this anticipated recirculation of some trainees that prompted me to append "re-training" to the name of these centers.

Capability for Program Changes

The second general area is that of creating a facility which can be adapted for new programs and new training techniques. The training offerings of a young adult center will probably range from some which reflect standard employment opportunities for retardates, to those which are relatively short term efforts created to meet the employment needs of an emerging occupation. Among the former group we might find janitorial assistant training, training in work as domestics or homemaker aides, and training in other service areas such as food handling. These are occupations in which many retarded workers have demonstrated their capacity for employment.

The second group, those training programs which are more transient, will pose the major difficulties. Two forces, at least, will affect the transition from one training program to another. One of these will be the number of major modifications in physical plant necessary to accommodate the new program. The second is clearly a non-architectural question and resides more in the realm of human motivation. All I hope to accomplish here is to express my concern that these training centers not be committed to too narrow a range of programs by virtue of the facility which houses them.

Another dimension to this job-training issue with mentally retarded relates to the matter of space planning for any particular training program. It will be probably necessary to deal in training with much smaller units of the total job than is the case with non-retarded workers. A specific job will be broken into component units which can be taught to a retarded trainee. Only after successful mastery of a series of units will his performance approximate the full flow of activity on that job. In terms of the layout of a facility, it may be that the areas where the complete job is performed will be fewer in number, and, hence, take less space than the areas where only discrete portions of the task are learned. If the job to be learned is simply the operation of a machine, the matter of space allocation on the basis of teaching component parts is less critical than in a task where there is movement from one place to another in the performance of the job. In the first case you would probably teach all of the steps on the machine itself, while in the second you would probably teach the behaviors required at each of the several stations. A proper balance among areas cannot be achieved without experience, which again emphasizes the necessity of adaptability in space planning.

Compensations for Psychological Deficits

This brings us to the third and final area, that of designing a facility which will compensate for deficits in the intellectual functioning of the trainee. We are well acquainted with the concept of architectural barriers. Their removal is an environmental modification which we have grown to recognize as necessary for full participation by the physically handicapped in various life activities. Our experience thus far has been mainly with impediments produced by physical deficits. How can we accomplish similar results in the realm of psychological deficits?

A characteristic frequently found among the retarded is a limitation in processing and responding to verbal cues, whether written or spoken. One can assert that we live in a world which stresses verbal skills, so our task is to train the mentally retarded young adult to survive as best as he can. This is a strong position. If we look at this matter closely, however, we find that the mentally retarded are not the only people for whom language processing is a problem. Many persons with brain injuries resulting from strokes, disease and accident suffer similar deficits. Do we not have a responsibility to give additional study to at least two aspects of this situation? First, what can be learned about the efficient use of non-verbal cues in teaching people better use of verbal material? What greater use can be made of color-coding and non-verbal symbols (arrows, patterns) in training people to respond to the ocean of words which direct us daily? Secondly I contend that visual stimuli employed by an architect in directing movement from place to place, and the cues for producing desired behavior, are of extreme importance in the development of a training facility for retarded persons. Stated in another way, we all learn about a structure from our experiences in it. What can be done in the design of the structure to make it not only something about which we learn, but to make it an active element in the learning process. How, for example, can lighting, color scheme, and interior design be planned so that they afford usable training cues, and aid in the suppression of cues which might produce unwanted behavior? For example, can lighting be employed to reduce extraneous cues in a training situation, or to move a trainee from one place to another?

Another factor which we observe in our program and attempt to control is the deficit in many mentally retarded young people to respond selectively to stimuli. When this is present, and until it is controlled, focused behavior is impossible to bring about. They may attend to the task assigned to them, but they also respond to many other stimuli around them. The result is often a protracted training effort and a level of output which is below that which is possible for them under optimum conditions. Control for this deficit in their capacity to respond to selected stimuli begins with the evaluation and is, in fact, one of the variables studied in the evaluation phase. Questions take the form: " Is the trainee able to attend to a task and ignore extraneous stimuli?", "To what stimuli does he respond?", "What controls are necessary to eliminate this indiscriminate responding?". For the architect the task seems one of producing an environment for evaluation and training in which stimuli can be controlled in number and intensity. Eliminating them completely is impossible.

A final matter in this area is compensation for deficits in memory which are often seen among the retarded. I have alluded to methods for coping with this in earlier comments. One technique which has been tried with success is color coding of rooms, so that the trainee's program utilizes color cues to aid him in moving from place to place.

I can envision a building full of kids, each with a training schedule which would rival a Sherwin William color catalog.

In designing a facility which will serve to train and retrain young adults you will be unable to control for all areas of deficit. Much must be left to the staff who develop programs for each trainee. Consider this a fundamental problem in removing architectural barriers and, where barriers cannot be removed, design a facility which the staff can manipulate in order to provide the necessary environment for a given form of training.

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DESIGNING RESIDENTIAL LIVING UNITS FOR PERSONS WITH MENTAL RETARDATIONS

I hope to engage in a brief dialog with you. I have assigned myself the part of pointing up some of the knowledge we have about group living. Your part is to bring to bear your skills as an architect — to translate abstract living requirements into creatively concrete living arrangements.

I think of a residential unit as an arena for a program in daily living. I ask you to think of each resident for the living,rather than the bed space he requires. Residents will vary in their requirements for living space. The size of their sub-groups will vary too. Some residents have to be cared for in small groups of six or eight with close proximity to each other as well as with insulation from other groupings in order that their sense of proximity is not evaporated by diffused outside attractions. Other residents, in turn, will live and grow best in larger living space where there are opportunities for varied and differential social relationships and manifold social experiences. These observations point to the facts that on the one hand you would need to design space to allow for self-containment within sub-groups, on the other hand you would need to allow for small living groups, while designing space so that small groups could merge into larger groups for joint living activities.

An arena for living requires ample space for multiple activities: 1. activities involving living experience related to self-care (be it dressing, washing, or some aspects in preparing food); 2. living experiences with things or people; 3. and living experience in being away from others by oneself or with personally chosen others. Group living in the light of our contemporary knowledge requires immediate access to equipment for multiple use (i.e. small tables and comfortable chairs which can be handily arranged), and above all ample, accessible shelves and closets for storage of personal and group equipment, out-of-the-way corners for privacy and temporary freedom from group existence. Maybe we have to think of "seven" corner rooms, built-in nooks, and slanting ceilings in order that spatial arrangements allow versatility and reinforce a differential use of space. My emphasis upon self-contained socially manageable small arenas of living also suggest we give attention to thinking of ways for minimizing the impact of peripheral traffic and activities (such as phone calls, inter-staff contact, deliveries, etc.) which unavoidably engulf every residential living unit.

The residential living unit needs to be planned for the residents' capacity for coping with life expansively rather than within their limitations. We need to design units for what the residents can do in whatever way they tend to cope with life's demands. For instance: a unit with wheel chair residents obviously needs ramps for freedom of movement from room to room and to the outside; but more so, such a unit needs tables, shelves, access to water for fun and toileting, and vehicle activity space for the pursuit of the residents' living experiences. Residents with difficulties in walking need more than railings. They need wide window recesses and nooks to crawl in and out of, floors on which they can safely tumble, crawl, or continue floor activities best adapted to them. These living units need a comfortable floor. Life on the floor is for many residents a way of coping with everyday living, and units need to be adapted accordingly. Let me cite two more examples: Some residents have to spend most of their time in a prone position. This does not mean a life in bed; but it does suggest that the "world" of useful stimulation has to be brought to them. The ceiling is their horizon. Let us bring something closer and more stimulating within their orbit of existence than a blank wall. Other residents, for example, struggle hard to learn time with the aid of such educational aids as cardboard clocks. Let us also build in large clocks on the level of their eyesight within the living units rather than high up on the wall.

The contemporary thinking of professionals concerned with residential living recognizes the residential worker — the attendant, child-care worker, or whatever you may want to call him — as the central person in the residents' care and rehabilitation program. This central caring person needs not only visual reach and surveillance of his groups but,most important, social reach and personal contacts with each resident. The latter demands physical arrangements which keep the caring personnel personally in touch with the residents , rather than merely accessible and dispatchable for moments of crisis. Too, teamwork has grown to mean not only interdisciplinary planning, but also interdisciplinary functioning. Our understanding of this deeper dimension of teamwork points to the necessity for bringing together and integrating multiple efforts in action. Residential workers, physicians, social workers, recreation specialists, teachers, etc. need to be housed right in the residential unit in the area of everyday life where they can work together. Residential units need to be designed to allow teamwork in process where it counts, and not merely where it is master-minded.

We have been reminded for more than a decade that residential institutions and units should remain within the spheres of the ordinary community's life. Such a trend includes the understanding that the residential program itself has to build in ordinary community life experiences for those residents for whom regular life, even if nearby, is still not within their sphere of daily experience. We need to think of creating visiting space and furnishings right in the living units for visiting families and friends of the residents. They are the ones who bring the outside in. We need to see that ordinary community experiences will become available to those residents who really cannot, for the present, move beyond their living unit's boundaries. Also, such residents need such experiences within their unit as offered at a drugstore counter, or a half-way apartment, etc. Other forms of community life can hopefully become an integral part of residential living within the grounds as long as ordinary community life remains outside of these residents' coping capacity.

In conclusion I would like to state again that living space has to be designed to foster and sustain the size of group that residents themselves can beneficially manage. The trend undoubtedly is toward smaller units. It is likely that whatever we define as 'small' groups today will not be sufficiently 'small' in years to come. Thus, living units need to be designed to allow added sub-divisions within the lifetime of the building. Above all, I trust that you will remain mindful of the fact that at a future date a person other than myself will introduce new ideas; he will quickly render our present concepts obsolete. Institutional units in a society of change can no longer be constructed as memorials to the builders, but rather they need to be designed as an invitation for change by future planners. New living units need to be built well -- that is, well for a temporary set-up. We should welcome the necessary alterations as the struggle for new and more useful concepts of residential architecture.

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LIVING UNITS FOR THE MILD AND MODERATE RETARDED

I suspect that these sessions will produce little that is new to architects in the way of innovations in structural features, such as the design of toilet areas, recreation areas, classrooms, dining rooms, dormitory accommodations, but what may take place in this workshop is a change in value orientation on the part of the architect. This, I submit, is most desirable and valuable to the field. I believe these sessions should serve as reality therapy for architects who have assumed responsibility for designing facilities for the mentally retarded. The term " reality therapy" has come into vogue among the helping professions, particularly among correctional workers employed in detention homes, reformatories, and prisons. The key concepts in reality therapy — an this is a gross oversimplification of the reality therapy concept as developed by Dr. W. Glasser — are as follows:

1. The principle of personal involvement on the part of the therapist. Personal involvement implies total commitment and total participation in the life activities of the youth in the institution.

2. The principle of concentration of effort and interest on the present — the here and now — life of the individual. The past represents failure; the objective is to make the present a success experience.

3. The principle of behavior modification. This implies bending all efforts to produce behavior that will lead to satisfying, successful experiences in living.

What does this have to do with an architect charged with responsibility for designing a first-rate facility for the mentally retarded? Let us examine the first principle in reality therapy — personal involvement.

Many of the speakers have implored the architect to become intimately involved in the daily rhythm of life in the institution. Dr. Helsel recommended that the architect spend several days at the institution for the purpose of observing the patterns of patient activities before going to the drawing board. Spending time in the director's office or consulting with professional staff represents, in essence, only limited involvement on the part of the architect.

All of us share equal responsibility for creating opportunity and devising new approaches so that maximum feasible involvement becomes a reality for the architect. A thorough study of the process of involving the architect in early planning of the facility might be the subject for future architectural workshops.

Personal involvement by the architect also means discovering the philosophy, the frames of reference of the professionals -- the providers of service. The difficult part in the process of consulting in a multi-disciplined setting is identifying the elements of consensus regarding values and methods in providing service among the staff members. The architect can serve as a unifying and coordinating force in planning program development and design. It is important to study the methodology employed by architects in their effort to arrive at a desirable level of agreement among the professionals employed in the institution. I wonder whether architects have unwittingly created blinders for themselves in certain key areas of staff and patient functions that prevent accurate, realistic assessment of the needs of the users of the facility.

The second principle or concept in reality stresses the importance of the present. I believe that all of us suffer from a certain degree of social and cultural lag. We received our professional education many years ago. Our basic value orientations were established in family life situations -- again, many years ago. Though we may pride ourselves on our forward look at life, we may be looking through cloudy lenses. We may harbor certain biases and prejudices which distort our notion of the state of the world. Self- awareness is hard to come by. Many people spend thousands of dollars reposing on the couches of analysts in search of the elusive goal of insight. My point is that we are not really looking at the present as it really exists; I question to what extent we really understand the revolutionary change in concepts regarding the capabilities of the mentally retarded for productive living in today's world. Professionals who live and work intimately with the handicapped must constantly re-examine and reinforce their belief in the potential of the handicapped for productive living. The architect who is really a transitory or temporary agent in the process does not have the protection of time and experience possessed by the professional worker. It is important for the architect to examine the frame of reference employed by the professional for assessing the life's needs of the mentally retarded. Is he present oriented?

The third principle in reality therapy is that of behavior modification. I believe the architect has enormous potential for breaking down compartmentalization psychologically as well as physically in the institution. If our aim in facility design is to achieve total integration of services, as opposed to compartmentalization, then we must avoid the trap of vested interests in professional domains. Designing neat little compartments for various service units may serve to enhance separatism and isolation; and the architect may have, in a real sense, negatively influenced the behavior of staff and patients.

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SOME CONSIDERATIONS IN DESIGNING FACILITIES FOR THE DEAF

In introducing a discussion of facilities for the deaf we must first define the term "deaf". In common parlance, anyone who has a hearing impairment is deaf. Generally however, these people are not deaf, but rather hard of hearing. Although they have lost part of their hearing they usually continue to have a substantial amount of residual hearing. Residual hearing is the term applied to the amount of hearing that remains after some of it has been lost through sickness, disease, accidents, aging, etc. Thirty years ago the Conference of Executives of American Schools for the Deaf clarified matters by adopting two definitions -- one for "the deaf," and the other for "the hard of hearing." These definitions are as follows:

The deaf: those in whom the sense of hearing is non-functional for the ordinary purposes of life. This general group is made up of two distinct classes based entirely on the time of the loss of hearing: a.) the congenitally deaf-- those who were born deaf; b.) the adventitiously deaf -- those who were born with normal hearing but in whom the sense of hearing is non-functional later through illness or accident.

The hard of hearing: those in whom the sense of hearing, although defective, is functional with or without hearing aid.

Now somewhat muddying the waters of these clear definitions is the fact that most deaf children have a small but useful portion of the auditory area that lies above the range of usual audiometry. Therefore, many children who have been termed "totally deaf" as a result of audiometric tests actually can hear properly amplified sound. Silverman, who has pointed this out, stresses that formal auditory training is essential to teach the deaf child to make use of this remnant of hearing. The auditory area that remains for these children lies at high sound pressure levels near the threshold of pain. These levels can be reached for communication only by means of powerful hearing aids, both individual and group aids. This dependence upon the use of hearing aids and auditory training has important implications on the design of facilities for the deaf which will be elaborated later.

Another aspect of the training of a deaf child which should be taken into consideration when designing facilities for the deaf is his need for speech-reading or lip-reading training. The child with normal hearing learns to speak and develops language because he hears. If I were to turn off the lights in this room now so that you could not see my face and lips I could still communicate with you through spoken voice because you have adequate hearing. But, if you were deaf, our ability to communicate would be greatly impaired since you would be dependent upon reading my lips and facial expressions. Children with impaired hearing depend upon their eyes to supplement their residual hearing. How much they depend upon their eyes is in large measure determined by the type and degree of their hearing impairment. If they have little or no hearing, then vision becomes the primary sense through which communication is established and maintained. This dependence upon the use of vision to aid communication also has important implications upon the design of facilities for the deaf.

In addition to the auditory and visual senses deaf children are taught to make use of the tactile channel. The vibratory or tactile sensory channel is most commonly used by placing the child's fingertips or hands in contact with his own or his teacher's face or head during speech learning attempts. Some teaching techniques which train the tactile sense employ the use of sounding boards, including pianos, drums, and diaphragms which are caused to vibrate by speech and music. One deaf adult, according to Ewing, testified to the importance of vibratory stimulation when she commented, "I feel the sound which I cannot hear and in time I learn to recognize the different sounds by their vibrations; thus, when walking down the street, I can tell when a bus is about to overtake me by the vibration it gives out".

With the brief foregoing exposition, an attempt has been made to set the stage for a discussion of the facilities which will be needed in working with the deaf. In opening this discussion first let us consider how sound behaves in a room. Much of what follows is discussed in greater detail in Ewing's book entitled, Educational Guidance and the Deaf Child , published by The Volta Bureau, Washington, D.C.

In an open field, if we produce a sound, the sound waves spread out in all directions from their source. The loudness of the sound diminishes as the distance increases.

The pattern of sound that we hear depends upon its source and the environment in which we are listening. We would all agree that the sound we hear within a room is different from that which we hear in the open air, even though the sound source is the same in both situations. In a room, the walls and ceiling reflect the sound waves which hit them. The shape and size of the room, whether it is empty or furnished, the materials of which the walls and ceiling are made, the kinds of furnishings, the position of the listener and other factors can change the sounds which are heard. The sound energy is confined by the walls and therefore the intensity level of a sound inside a room is more than it would be out in the open air. Room surfaces reflect sound in much the same way that they reflect light. A portion of the sound energy striking the ceiling and wall surfaces is reflected and the rest is either transmitted through the wall or is dissipated as heat. The sound which is not reflected is said to have been absorbed by the surface. The splitting of the incident sound into reflected and absorbed portions depends mostly on the construction of the walls and the materials of which they are made. Smooth, perfectly rigid surfaces would tend to reflect most of the incident sound-energy and absorb little of it. Even though this situation does not exist, a hard polished surface tends to approach it. Generally, walls are usually somewhat flexible and porous, so that sound energy may be converted into heat by vibration and friction and viscosity in the fine crevices and openings of the material. As a rule, the greater the wall and ceiling porosity the greater the absorption and the less the reflection. In a home, for example, the soft furnishings in the living room are relatively good absorbers of sound, whereas the ceramic tiles in the bathroom are good reflectors. Additional factors that govern the degree of absorption are frequency of the sound and the angle of incidence. Draperies and other soft furnishings are usually better absorbers of high frequencies than of low ones. The absorption capacity of commercially manufactured acoustic tiles depends on porosity, and these are generally more efficient at higher than at lower frequencies.

One of the consequences of reflection is that the sound-level in a room is more or less uniform. If there were no reflecting surfaces, the level of sound pressure would fall off according to the inverse square law as the distance from the source increased. This happens high above the ground in the open and in an anechoic chamber, a room whose walls are perfect absorbers. In an ordinary room the sound pressure level at a point is a combination of the sound which has followed the direct path between the source and the point and that which reaches the point indirectly, that is, after reflection. The direct wave predominates in the immediate vicinity of the sound source, but beyond about three to five feet from the source, the reflected waves predominate, and it is here that the sound level is more or less uniform. (See page 165 Educational Guidance and the Deaf Child showing typical results of measurements obtained by Ewing with sound-level meter in a variety of rooms containing different amounts of absorption).

An important acoustic aspect which needs to be taken into consideration in the design of facilities for the deaf is reverberation. A well-known feature of the behavior of sound in an unfurnished room is its hollow, echoing quality. Such a room is said to be reverberant. The reverberation of sound in a "live" room leads to a piling up of echoes in such a way that both frequency and phase distortion are introduced. The individual speech sounds tend to lose their individuality, to run together into an unintelligible blur. Sound travels at more than 1100 feet per second and therefore in an ordinary room there may be several hundred reflections of sound in a second. These repeated reflections are the cause of reverberation, which is the name given to the persistence of sound in a room after the sound source has ceased. The time for which the sound continues to exist depends on the rate of absorption in the room. Every time that a sound wave is reflected , some of its energy is absorbed. The intensity of sound coming away from a wall is always less than that of the sound striking the wall and thus, eventually, the sound dies away. If the walls are good absorbers, the sound dies quickly. However, if they are highly reflecting, it may remain audible for many seconds. There are some churches and halls in which it is reported that sound can be heard for more than ten seconds after the source has stopped. Reverberation can make speech quite unintelligible and small audiences in large auditoriums often find it very difficult to follow a speaker.

In small rooms, such as many classrooms in schools for the deaf, reverberation may make listening unpleasant, but it is unlikely to make speech unintelligible to those with normal hearing. A deaf child, however, is in a very different position when he is dependent to any significant extent on a hearing aid. Differences in the patterns of sound which reach the two ears of a normal listener enable him to locate its source and then to focus his attention on that source. In effect he is able to discriminate against unwanted sound.

Although today many deaf children have been fitted with binaural hearing aids, most hearing-handicapped children with profound losses continue to use monaural fittings. For these children therefore, a hearing aid has all the disadvantages of listening with only one ear. For them a hearing aid is a monaural hearing device; the microphone cannot discriminate, it cannot focus its attention, it must "hear" everything. This characteristic of monaural hearing aids often makes listening in a room which may seem acoustically good to the normal hearer, quite intolerable to a child depending on a hearing aid.

The reverberant quality of a room is often described by its "reverberation time." This is the time which it takes for the sound-pressure level to fall to 60 decibels below its initial value. The fall depends on the frequency of the sound, because the absorption rate depends upon frequency. Roughly speaking, the reverberation time is the time which a sound can be heard after the source has stopped. The reverberation time of a classroom is usually more than a second, and since a syllable takes only about a quarter of a second to say, reverberation, by a masking process, renders speech less intelligible. In a three-syllable word, for example, the last syllable may only be heard against a background of strong reflections of the second syllable and weaker reflections of the first. The intelligibility of speech depends mainly on consonants which are generally made up of high-frequency sounds and are much less powerful than vowel sounds. The frequency range from 1000 through 8000 cycles per second, for example, contains only 5% of the power of speech, but is responsible for 60% of the intelligibility. Both of these characteristics of vowels and consonants contribute to the masking, for absorption takes place chiefly at the higher frequencies and the weaker consonants are swamped by the comparatively powerful vowel reflections. This effect is clearly shown in results of tests of the intelligibility of speech which have been carried out in conditions of reverberation. The impairment of intelligibility caused by reverberation has been measured by Steinberg. He found that the sounds most affected were short vowels, nasal consonants, and stop consonants. Ewing reports that reverberation times in classrooms for the deaf are often found to be of the order of 2 to 3 seconds. This is much too high for the efficient use of hearing aids. Experiments conducted at Manchester University have shown that in a typical classroom, satisfactory results were obtained when reverberation time was reduced to a half a second by the use of suitable sound absorbing materials. Tables of absorption coefficients of materials are available in the literature and from the manufacturers of sound-absorptive products. Knudsen and Harris have published comprehensive tables of absorption coefficients which cover both normal building materials and materials designed for acoustic absorption.

It is difficult to lay down acoustic standards which can be applied universally to rooms intended for children using individual hearing aids. Ewing reports in general that to control reverberation, treatment of about one-quarter of the total surface area has given satisfactory results in a classroom whose size and construction are similar to those in many schools for the deaf. The treatment should not be confined to any one surface, such as the ceiling. Knudsen and Harris say that, ideally, absorbing material should be positioned in patches at random about the room for good diffusion of the sound field. In schools for the deaf,treatment has usually been applied to the ceilings and the upper parts of the walls, to be out of the reach of children.

One further acoustic aspect which needs consideration when designing facilities for the deaf is noise. Noise has been defined by someone as "unwanted sound." It is often said to be one of the main characteristics of our modern life. A person with normal hearing can understand speech, despite considerable background noise, because his binaural hearing enables him to focus his attention on foreground speech while ignoring background noise. However, a hearing-impaired listener who depends on a monaural hearing aid to enhance his hearing may find noise as troublesome a problem as reverberation. The microphone of his hearing aid picks up both speech and noise and amplifies them equally. Deafness may prevent a child from hearing much of the amplified noise, but sounds which have levels of the same order of magnitude as speech will mask the speech. The masking effects of reverberation and noise may not render speech wholly unintelligible,but they may make listening a strain. Mental fatique is one of the harmful effects of noise and when hearing-handicapped children have to listen to speech against a noise background, both learning and teaching are made more difficult. Some authorities have suggested that the presence of noise and reverberation, and the extent to which they mask speech may be one of the main reasons for the unwillingness of some children to use their hearing aids consistently.

In a building one is faced with two different types of noises. These are external airborne noises and internal structure-borne noises. Outside airborne noises are carried through openings such as open windows and doors and cracks around ill-fitting windows and doors. Ventilating, heating, and airconditoning ducts are additional examples of air paths along which noise can be transmitted. Gaps between a door and its frame can also allow a great quantity of noise to enter a room. Ewing tells of a series of readings which were made of the sound-level produced in a room close to a busy road. With the window open twenty inches, the average level of noise in the room was about 60 decibels; with the same window open only a fourth of an in inch, the noise level in the room was still 46 decibels. The peaks of noise, ofcourse, were much higher than this. Doors and windows are good insulators against noise only if they are tight fitting. Obviously, facilities for the deaf should not be built near arterial roads, railroads, airports, or industrial sites because of attendant noises.

Internal, structure-borne noises are sometimes more of a problem in a school for the deaf than are external airborne noises. Partitions between rooms are often set into vibration by sound waves incident upon them, and in this way sounds originating in one room are transmitted into an adjacent room. The sound insulating properties of rigid partitions depend on their weight per unit area, and on the frequency of sound. The heavier the wall, the more difficult it is to set it into vibrations and, therefore, the better the sound insulation. Each doubling of the weight, will, on the average, increase the sound insulation by about 4 or 5 decibels. The walls of a room may also be set into vibration by impact sounds which may originate a great distance away. Impact noise due to vibrating heating or ventilating equipment, hammering, dragging furniture across a floor, footsteps, etc., can be carried through a building with high efficiency for sizable distances. These impulsive noises can often be controlled at their source by providing some resilient material to damp the vibration before it reaches the area housing the hearing-impaired child. A common example of this type of noise transmission in frame construction is when the sound of footsteps and the shifting of desks is passed through the floor of a room to the room below. In new buildings much can be done to reduce structure-borne noise by discontinuous construction.

What are acceptable levels of noise in facilities for the deaf? The sound level of noise that should be permitted to enter a classroom for the deaf should not exceed 30 to 35 decibels, as measured by the A-scale of the sound level meter. (A sound level meter is an instrument including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of noise and sound levels in a specified manner.) This figure of 30 to 35 decibels, in turn determines the maximum level of noise that can be accepted on a site where a facility for the deaf is to be built. The paths of least resistance to noise are the windows, which, if closed, will provide up to 30 decibels of sound reduction. Thus, noise levels up to 60 decibels are tolerable on the site,provided the windows stay shut. Open windows provide little sound reduction, but if noise levels are not greater than about 60 decibels they can probably be brought down to acceptable levels by landscaping and careful layout of the buildings. Noise can be reduced, ofcourse, by planting screens of hedges, thick shrubs, and trees. Windows can be arranged to open only on the side away from the external noises.

Inside facilities for the deaf the partitions between classrooms and between corridors and classrooms should provide a sound reduction of about 45 decibels, according to Ewing. A four and one half inch brick wall plastered on both sides has a transmission loss of 40 to 45 decibels and is satisfactory in this respect for normal noise levels, but some modern light-weight partitions are very unsatisfactory. Impact noises are frequently a problem. Often in frame structures the frames are made of a variety of members all rigidly fixed together and forming a number of paths, continuous in one material, along which vibrations are fairly easily transmitted. Impact noises can be controlled in such a structure by introducing changes in the material of which the paths for sound are made. As an example, a beam, instead of being rigidly fixed, may be supported on a resilient pad or spring. This type of construction has been called discontinuous, because discontinuities of material are introduced in the transmission paths , and it attempts to isolate each unit in the frame from each other unit. The noise due to impacts on floors is one of the commonest sources of disturbance. These disturbances can be greatly reduced if all classroom, corridor and internal circulation floor areas are finished with an appropriate resilient material. Carpets with thick rubber pads are coming more and more into use to help solve the problem. An extensive set of criteria for noise control, based on A-weighted sound levels, is given in the American Society of Heating, Refrigerating and Air-conditoning Engineers Guide and Data Book, Fundamentals and Equipment , 1965-66, Chapter 14.

Since the deaf are dependent to a large extent on developing speech-reading skills they need the proper environment to enhance this learning. A poorly lighted room that throws deep shadows on the speaker's face, or a seating arrangement that forces the speech-reader to look into a bright light is bad. The best possible practices in illumination should be observed, with optimum light but minimum glare. The placement of seats in relation to light, type of artificial lighting, numbers of bulbs, maintenance of light fixtures; the coloring and surfaces of furniture, walls, and ceilings; the decoration of rooms -- all are of importance to correct illumination. Enough light should be provided so that closed circuit television is possible without auxiliary lighting.

If the facility for the deaf is to include provision for testing the hearing of both normal and hearing-impaired persons, then specialized audiology rooms and equipment will have to be provided. If persons with normal or near normal hearing are to be given tests of hearing acuity, then the room in which the testing is to be performed should be properly sound-treated for excluding outside interference. According to Snow, a normal-hearing listener can respond to all of the test tones from 250 through 6000 cps at a hearing level of zero decibels if the band levels within the test room do not exceed 40 decibels for the octave bands 150-300, 300-600, and 600-1200 cps; 47 decibels for the octave bands 1200-2400 cps; 57 decibels for the octave band 2400-4800 cps; and 67 decibels for the octave band 4800-10,000 cps. Naturally, the amount of attenuation of sound required to achieve the necessary levels within the room will depend on the amount of noise in the environment in which the test room is placed. This implies that the room should be isolated as much as possible from extraneous sounds, and should be located away from outside walls, busy hallways, elevators, music room, and heating and plumbing noises.

In designing an audiology unit for a facility for the deaf it would be well to heed the advice of Dr. Moe Bergman who has written, "Experience gained in the planning of several audiology clinics and in the inspection of audiology units indicates that audiologists should attempt only to determine the basic architectural requirements peculiar to their clinic plans and needs. The final construction plan should be prepared by an architect competent in acoustics." He cites several tragic examples where technical planning without the advice of experts had unfortunate results. In one instance a sound-proofed test room was constructed at a cost of over $10,000 only to show a major construction tie between the regular clinic and a supposedly "floated" wall of the audiometric test room. This nullified vibration isolation so that footsteps originating outside were perceived clearly in the test room. In other instances " sound-proof" rooms have been constructed for audiometry where isolation and absorption are generally satisfactory, but where sound enters the room through doors not properly designed, or poorly seated or sealed, or through ventilating ducts which transmit all the noises of the outside corridors. Commercially built prefabricated sound-proof hearing testing chambers are available and are widely used to circumvent design difficulties inherent in many poorly engineered carpenter-built rooms.

Many audiology facilities, especially those having research studies as a part of their function will require an electrostatic shielding or grounding system. It is usually necessary to shield the equipment of the acoustically controlled area from the disturbing influences caused by ungrounded fluorescent lights, electro-therapy equipment and other electric emanations from mercury arc equipment. In addition to the use of the three-wire electrical system throughout its new facility, one new audiology clinic provided two special grounding systems. Two 40-ft ground rods were installed beneath the basement floor. Since the water table was found to be six feet below the basement, approximately 33 feet of each rod was in water. One ground system was carried by heavy copper wire in conduit to ground terminals in all research laboratories as well as in the audiological suites. This system provided a good earth ground, isolated from the building electrical ground, for the grounding of special equipment. Great care was taken not to ground equipment to the special ground without first eliminating any tie to the building ground wire. In this way isolation was maintained and the special ground was kept free of loops and noise.

In regard to fire alarm systems in facilities for the deaf both auditory and visual warning signals should be provided. Appropriately placed red lights which can be flashed in case of fire to alert the deaf,as well as loud bell alarms should be provided.

In this overview of some of the special design features which need to be considered in planning facilities for the deaf, I have listed those features which I felt were of prime importance. In view of the highly specialized nature of the design of facilities for the deaf I urge you to seek technical advice and consultation from specialists in audiology, acoustics, and deaf education as you plan.

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FACILITIES FOR THE BLIND/RETARDED

I am here to talk about physical plant facilities for blind children in a residential situation. It is impossible to discuss the subject intelligently without looking at the program, without considering why the program exists, what the goals of the program are, what the philosophy of the school is, and what the curriculum contains. To relate this to you I plan to tell you about our philosophy, our goals, and our curriculum, and at the same time show you some special features that are being developed on our campus to enhance the program.

The Oregon State School for the Blind is administered by the Oregon State Board of Control, and has been in existence since 1873. Over the years it has developed to the point where the campus now contains seven modern buildings, a boiler plant and maintenance repair shop and a series of storerooms and garages. These buildings are located on a 7½ acre campus just six blocks south of the State Capitol.

Few, if any of us concerned with planning and programming for visually impaired students in residential situations will ever have the opportunity to plan and create from the beginning a facility just as we would wish. Therefore we must learn to modify existing facilities to meet our needs, or to add those features which are not in existence.

At our Oregon State School for the Blind there are seven major buildings with which students come in contact during the course of the day. Ours is a campus-style school, as opposed to one having facilities such as living quarters, kitchen, dining room, school under one roof.

Having inherited this physical plant, what can I do to make it relevant to today's program? This campus has one building erected in 1926, another in 1935, and the rest built in the late 1950's. As we think of our philosophy today , we believe the visually handicapped child is first a child. His emotions, desires, and needs to learn are fundamentally the same as those of other children. His means and methods of learning, and of meeting these needs will,of necessity, vary in some areas. We must make of him a well functioning individual in this society, not a person who cannot see, but a blind person using the senses he has most effectively.

Our goals are:

1. Education: To assist blind and visually impaired children to attain a level of individual mastery of their physical, social, emotional, academic and spiritual world.

2. Interpretation: To assist the public to attain an informed status about the many visual deficit conditions, and the implications of these conditions for personal adjustment and individual competence within the context of community living.

3. Leadership: To assist the staff to develop further their capabilities, attitudes and level of satisfaction, to promote the effectiveness of their performance in their many roles in the school.

4. Research: To provide a setting for school staff and other qualified investigators for the continuous exploration of problems associated with visual impairment. Such exploration would be directed toward discovering new knowledge, new approaches, new materials, and toward perfecting existing methods and materials to enhance the community effort in behalf of blind and visually impaired children.

5. Participation: To contribute as an integral member agency to the community welfare.

On our campus we are continually searching to determine what is missing and what can be done to move the program forward. The most serious problem brought about by blindness is sensory deprivation, so we must think about this as we create our physical plant and develop our program. Our Sensory Stimulation Center, for example, is designed to overcome this deficit, and is the result of a series of conferences with teachers and administrators working with a creative architect.

We are thinking about new concepts for dormitory life. With our present population we need something other than a dormitory with a series of rooms off the center hall. We need an area for teaching living skills, we need an area for recreation, and we need to think in terms of students living in units, rather than big boys here, little boys there, boys in this buildings, girls in another. Learning takes place in the dormitory as well as in the classroom building. See learning as living through meaningful situations, and have your program based upon the needs, interests, and capacities of the children. Our residence has been modified to include an area for recreation, crafts, cooking, and the teaching of living skills. The building was raised to provide a space for recreation underneath, where children can play with little supervision. Finally, the new building has been carefully tied to the old, so that it remains a very attractive structure.

In a proposed park, on an undeveloped area of the campus, we plan to provide activity centers, such as an animal shelter, draw bridges, canal for boating, fruit trees, herb garden, fire pit, junk yard, and many other things.

All building on our campus is done to enhance the program. No program should be created to enhance a building. And, all planning must be for the future. This compels us to think before building, to plan before progressing, and to study the needs before stepping forward, because concrete and brick buildings that we erect will be with us, and with generations to come.

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JOINT MENTAL HEALTH/MENTAL RETARDATION FACILITIES

Community mental health and mental retardation centers are new kinds of facilities. As part of a national trend these health services are now to be community-based, community-operated, and community-centered.

Traditionally we have hidden these problems. Now, identity and visibility are given to promote care, prevention, and to remove stigma. Identity is an important part of the approach.

Combining mental health facilities with mental retardation facilities leads to questions: Should they be part of a total health services center? Should they be combined? Should they be independent? Should they be affiliated but retain separate identities? What are the aims, and what can architecture do to promote them?

Much depends on levels of sophistication, previous orientation, sponsoring agencies, power structure, financing. In short, each community will need its own solution.

As architects we have to understand the new direction and translate patterns of care into physical solutions. For our firm this understanding takes place in programming.

Architectural programming is the most important phase in design, because it is seeking for the problem. It requires a joint effort by two groups: the health facility staff, and the architectural staff. Together the groups form a team. The client defines therapy modalities. The architect is responsible for site and space analysis. Together as a team we define facts and identify concepts. Then we analyze data to determine needs, and finally we seek the uniqueness of the project.

Clients purchase facilities. The client (staff, administration or board) is rarely trained in architecture and may not have been involved in a building program before. An educational process is necessary.

We teach the client the potentials of architecture. He teaches us his specialty. Rather than talking and going away to draw,we move our team into a temporary office in or near the client's home base. We want our team to be part of the total experience, to have the opportunity for continued and informal interaction with the client. By making the client part of the team we reap the benefits of interdisciplinary interaction.

It is important that responsible persons with complete authority to make decisions are designated. Only in this way can communication be effective. Techniques to achieve good communications are important. The written word is only partially effective. We use flow diagrams to explain relationships of elements. We try to diagram every fact, every concept, and rely on the written word in only a limited way. Graphic analysis cards are used to present each statement, to translate verbal to visual. We demonstrate our understanding of information and provide feedback to the whole team.

We break the process into two phases. The first defines basic concepts; the second provides detailed information for design development. The heart of our process is a simple step-by-step method:

1. Establish aims
2. Collect, organize, and analyze facts
3. Uncover and develop concepts
4. Determine needs
5. State the problem
6. Investigate possible alternative solutions
7. The solution

Establish aims

Each center has particular objectives and policies for achieving these goals. Goals provide inspiration for design and are usually discussed at the beginning. They must be captured and documented then, lest they be lost in the avalanche of later details.

A most basic goal is community orientation. We emphasize that these facilities were at one time self-contained communities -- difficult to get into or out of. Now they have to relate to the outside world. We emphasize that not just the individual nor the family, but the entire community is the focus of concern.

Another goal is to have coordinated services, so that the patient and his family are not fragmented in order to receive treatment. Naturally this leads to the requirement that the center establish a continuing relationship with the patient/family unit.

It is important that the facility be non-institutional. Effects of physical environment are not easily measured. Surely privacy, dignity, and security affect physical and mental attitudes.

Collect, analyze, organize facts

Among the facts are numbers, activities, spaces, aspects of codes, site and,naturally,cost and time. On one level the concern is with who, where and how many; on the other the client as a team member has to contribute his factual and functional requirements. For example: the patient's sensory mechanisms are altered. Surrounding conditions can produce or aggravate illness or promote health and recovery. All spaces produce reactions , positively to promote function, or negatively. There is no neutral area to which people do not react.

First the individual patient tends to perceive the whole of his physical environment, before being able to define or comprehend details. Therefore, space organization must give clear initial and continuing orientation.

As with any facility, the problems deal with human wants and needs. The more design considers an individual's dignity, the more it is tailored to fit his physical, emotional, and psychological needs, the more positive the response will be.

Uncover and develop concepts

We use some basic concepts as a general test of programs:
a. Flexibility: Growth may require change, but building for ultimate flexibility is expensive. We must look for ways to allow change that will not require major physical alterations. Versatility can be achieved by having spaces that can accommodate more than one type of activity or discipline.
b. Centralized or decentralized services: Is there one dining area, for example, or are there snack bars and other dining areas? Generally the choice of centralization versus decentralization of services depends on preferred flow through the building, and preferred interaction of residents.
c. Compartmentalization or integration of space: In either case much space is devoted to staff offices. Integration

of the many office/treatment spaces allows them to be grouped by discipline, or by team units without regard to particular discipline, based on administrative decision at any particular time.

Determine Needs

If needs are not determined during the programming phase, we will have a vague program and an unbalanced budget. For example, in order to balance need and cost we made one office study for a center and found:
a. That staff needed a small home base out of which to work;
b. That after a relationship between staff member and patient was established, it was possible to move location of therapy without affecting progress.
Therefore we programmed fairly small staff offices with convenient shared conference/consultation spaces. In the final analysis approximately 25% more programmed space was provided within the established site and budget.

State the Problem

The facility is not a freestanding piece of sculpture, but is a part of the total community. Different site situations produce different responses to the need for visibility.

The Manhattan Community Mental Health Center has physical limitations due to existing subways. The site is new. It was created by closing a main traffic artery to make a superblock. In design the existing pedestrian pattern was used to take the community through a central garden court as part of its normal daily movement, placing it in constant contact with the facility.

A different solution was applied in the equally urban Maimonides Community Health Center, where the restricted site was tucked between the hospital and the community. In our solution we related the new center to the existing community by careful architectural massing, using brick and arches.

A semi-urban site to be developed for the Texas Children's Hospital and Baylor University Mental Retardation Center in Houston presented another problem. Since visibility is primarily from automobiles, the building had to make its first impact as a mass from a distance.

After visibility and contact there is need for transition. Design has to invite, to provide a transition between exterior and interior that allows easy movement into services.

At the Manhattan Community Health Center, the central court is the transition area. It allows view of movement in waiting and circulation spaces which are placed above court level to preserve privacy.

At Maimonides transition is by a sunken exterior court, reached by ramp and steps. The court opens circulation and waiting spaces to enough public view to indicate ease of flow, but not enough to erase privacy.

Houston's climate led us to provide a great covered space as the entry/transition area around which the building elements are located. Here child play, sitting areas, and landscaping ease transition.

Clear, comprehensive organization is essential. Circulation patterns must provide orientation and promote interaction. If the site is large, the solution may be similar to a suburban shopping center — a mall with elements around it. If the problem has to be solved vertically, the elements have to be stacked. Consequently we have to find ways to foster easy visual as well as physical vertical flow.

When we continue the process into the interior design we find three additional requirements:

a. Residentialization, or fitting the environment to individual needs. This does not mean making it a home. A person using the center should know where he is. He must not be confused by pretending that the facility is his home.

b. Aesthetic obsolescence. We cannot expect a facility to remain pristine forever. If we want permanence in materials, textures and colors we are automatically limited to the flat, slick, and shiny. Even if we did select by maintenance standards alone,we could not achieve absolute permanence. Actually, periodic change is beneficial since people need the stimulation of change.

c. Territoriality. Each resident has his personal needs, for example: we provide tack-boards in patient rooms.

We know that people add their own photographs and potted plants, therefore we select furniture accordingly. For orientation we vary color and shade from area to area. Essentially the background is quiet, and color is in changeable items like fabrics and prints.

Each center, whether for Mental Health or Mental Retardation, will differ. Programs will vary depending on the patients' handicaps. But in all facilities we deal with a complex network of interdependent space relationships. Generally we arrange elements into four major groups:

1. Reception: The first contact area, the place where initial rapport is established, the place for primary diagnosis.
2. The Living Unit: The home base for 24-hour patients.
3. Administration
4. The Community Core: Actually the major portion of the facility. The section in which involvement of patients, staff, and parents is forced, so that it becomes a. a community within itself; b. a community within the greater community; c. a community-oriented service, training and research unit.

Reception normally incorporates a lobby, admitting office, cashier, pharmacy, and waiting areas for adults and children. The children's waiting area should be a series of supervised play spaces. This would offer an early opportunity for staff to observe and evaluate.

In the Living Unit we require flexibility. Rooms may have to be adapted from one age or pathological condition to another. In addition several training, diagnosis, or treatment programs may be in operation at the same time. To satisfy these needs the living unit might be designed as several sub-units, each capable of being operated independently from a central control station.

Executive and Business Administration should be located out of main patient traffic routes, but should still be within easy access.

The Community Core would consist of six basic areas: a. Evaluation, diagnosis and treatment clinics; b. Day management center; c. Habilitation and/or Rehabilitation; d. Dining; e. Specialized Training areas; f. Group meeting facilities.

The evaluation, diagnosis, and treatment clinic will contain staff offices and diagnostic and diagnostic areas. Except where separation is required for medical examination, speech and hearing, offices could be grouped in small units. The aim would be to form identifiable, almost cottage-like sections that allow functional departmentalization. People could be grouped by discipline or team.

The day center would be concerned with management of those patients using the facility for one-half day or longer. Management includes day care and education as well as organization of patient movement through other disciplines. A day center may include special education, quiet and active game areas and lounge and conference spaces. The same area could be used for night patients, if sleeping spaces are provided.

Habilitation/Rehabilitation services include pre-vocational, occupational, physical and recreational therapies. Developing programs indicate a more interdisciplinary approach toward the four services, requiring easy movement between.

Food service might be for in-patients, day and night patients, out-patients, family and staff members. A defined load must be established. However the load may change due to changing programs and needs. For example, patients in a living unit may or may not be ambulant; they may be able to dine in a central area, or may remain in their rooms. We see that one method of operation cannot be frozen inflexibly into the structure.

Specialized training areas are places where the patient is not usually involved. These could be laboratories, a professional and family library, a staff lounge, and an audio-visual center to control the developing need for extensive electronic capability.

Group meeting facilities should be flexible, designed for use by patient, staff, and the community.

In sum, good programming provides a sound basis for responsible design. Through it we find the uniqueness of a project, we learn to understand the problems. A mental health/mental retardation facility must be: 1. A simple building, yet house a complex function; 2. A building that responds to the special needs of patients; 3. A building that invites interaction, rather than repels it; 4. A building that openly invites the community to enter.

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